WE CLAIM:

1. A tunable optical device comprising:

a compression tuned optical structure, responsive to an optical signal, and further responsive to a displacement sensor signal, for providing a compression tuned optical structure signal containing information about a change in an optical characteristic of the compression tuned optical structure, and for further providing an excitation caused by a change in a displacement of the compression tuned optical structure; and

a displacement sensor, responsive to the excitation, for providing the displacement sensor signal containing information about the change in the displacement of the compression tuned optical structure.

2. A tunable optical device according to claim 1, wherein the displacement sensor includes a capacitance sensor coupled to the compression tuned optical structure for measuring a change in capacitance that depends on a change in displacement.

3. A tunable optical device according to claim 1, wherein the capacitance sensor includes two parallel and opposing plates and the change in capacitance depends on a change in a gap or an area with respect to the two parallel and opposing plates.

4. A tunable optical device according to claim 2, wherein the change in the displacement of the compression tuned optical structure causes a change in the gap between the two parallel and opposing plates, and the change in capacitance depends on the change in the gap.

5. A tunable optical device according to claim 2, wherein the change in the displacement of the compression tuned optical structure causes a change in an overlapping area between the two parallel and opposing plates, and the change in capacitance depends on the change in the overlapping area.

6. A tunable optical device according to claim 1, wherein the compression tuned optical structure has a capacitance sensor having two metallic-coated tubes affixed to the compression tuned optical structure so that metallic surfaces face each other with a small gap inbetween.

7. A tunable optical device according to claim 6, wherein the small gap is about 200 micron.

8. A tunable optical device according to claim 4, wherein the compression tuned optical structure is a dogbone structure having wider end portions separated by a narrower intermediate portion; and

wherein each of the two metallic-coated tubes is affixed to or formed on a respective one of the wider end portions.

9. A tunable optical device according to claim 4, wherein the capacitance sensor has electrodes attached to the metallic-coated tubes to allow connection of the capacitor sensor to a displacement sensor circuit capable of measuring capacitance.

10. A tunable optical device according to claim 8, wherein the narrower intermediate portion has a fiber Bragg grating arranged therein.

11. A tunable optical device according to claim 4, wherein the narrower intermediate portion has a Fabry-Perot interferometer arranged therein.

12. A tunable optical device according to claim 1, wherein the displacement sensor includes a tube-in-tube capacitance sensor arrangement.

13. A tunable optical device according to claim 12, wherein the tube-in-tube capacitance sensor arrangement includes an inner tube with an inner capacitive plate and an outer tube with an outer capacitive plate.

14. A tunable optical device according to claim 1, wherein the displacement sensor includes a single tube capacitance sensor arrangement.

15. A tunable optical device according to claim 14, wherein the single tube capacitance sensor arrangement includes a tube with a first capacitive plate for capacitively cooperating with a second capacitive plate arranged on a surface of the compression tuned optical structure.

16. A tunable optical device according to claim 1, wherein the displacement sensor includes multiple tube-in-tube capacitance sensor arrangement.

17. A tunable optical device according to claim 16, wherein the multiple tube-in-tube capacitance sensor arrangement includes multiple inner tubes with respective inner capacitive plates and multiple outer tubes with multiple outer capacitive plates.

18. A tunable optical device according to claim 1, wherein the displacement sensor includes a differential capacitance sensor arrangement.

19. A tunable optical device according to claim 1, wherein the differential capacitance sensor arrangement include a first variable capacitor and a second variable capacitor.

20. A tunable optical device comprising:

a compression tuned optical structure, responsive to an optical signal, and further responsive to a sensor signal, for providing a compression tuned optical structure signal containing information about a change in an optical characteristic of the compression tuned optical structure, and for further providing an excitation caused by a change in a physical parameter in relation to the compression tuned optical structure; and

a sensor, responsive to the excitation, for providing the sensor signal containing information about the change in the physical parameter in relation to the compression tuned optical structure.

21. A tunable optical device according to claim 20, wherein the sensor senses a displacement in relation to the compression tuned optical structure.

22. A method for tuning a wavelength of a grating comprising the steps of:

obtaining a compression tunable element having a Bragg grating therein, the compression tunable element having a capacitor across the Bragg grating, the capactitor having plates and a gap inbetween that is related to the wavelength of the grating;

measuring a capacitance value of the capacitor; and

compressing the compression tunable element to set a desired grating wavelength based on the capacitive value.